Indirect interaction dynamics of barchan dunes(Poster session 2, New Frontiers in Colloidal Physics : A Bridge between Micro- and Macroscopic Concepts in Soft Matter)

AUTHOR(S):

Katsuki, Atsunari

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College of Science and Technology, Nihon Univ. Atsunari Katsuki [1]

多くの地形は流れと粉粒体で形成され、その代表的なものに砂丘がある。近年、砂丘の直接相互作用としての衝突現象が注目され詳細に調べられた [1,2]。そこで、本研究では、砂丘間に流れる砂によってもたらされる間接的相互作用に注目し研究をおこなった。その結果、バルハン（三日月型砂丘）間の間接相互作用によって３タイプの現象がみられることがわかった。（１）バルハンのホーンの先からでる砂によって、子バルハンができる。（２）風上の砂の状況によって、バルハンの大きさは変わる。（３）バルハンを風上と垂直な方向に移動させることができる。特に、（３）の現象は防災の観点から重要になる。砂漠では、道路や街が砂丘によってのみこまれる砂丘災害がある。もし、その砂丘の位置をずらすことができれば、砂丘災害を回避できるかもしれない。

Barchan dune appears in area of sparse sand and unidirectional wind flow. Barchan dunes tend to form chain pattern, the horn of one barchan pointing to the center of leeward barchan. The pattern has been observed in desert and Mars. However, it is difficult to investigate dune dynamics with field measurement because of large time scales such as several decades or more. Therefore dune dynamics has been investigated using numerical simulations, for example dune morphology and pattern. Also recently, interaction between barchan dunes has been studied. However, their studies focused only on collision, not but inter- dune sand flow between barchan dunes, the sand releasing from the horns of a barchan dunes. We investigate how the inter-dune sand flow work (or not) on the dune dynamics. A simulation isperformed by a simple model taking into account saltation and avalanche which eliminate complex turbulent wind profile. As an initial condition two barchans are situated, a smaller one is set behind larger one . The result indicates that the leeward barchan dune move towards the back of the horn of a windward one and form the chain pattern naturally. This lateral movement by sand indicates that we can manipulate movement of a barchan laterally by shifting the position of sand source. When there are structure such as roads and pipeline in the downwind of barchan dunes, shifting of the barchan dune is effectively way to protect their structure from danger of the barchan dune.

References

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[1]E-mail:katsuki@phys.ge.cst.nihon-u.ac.jp